Fig: 8

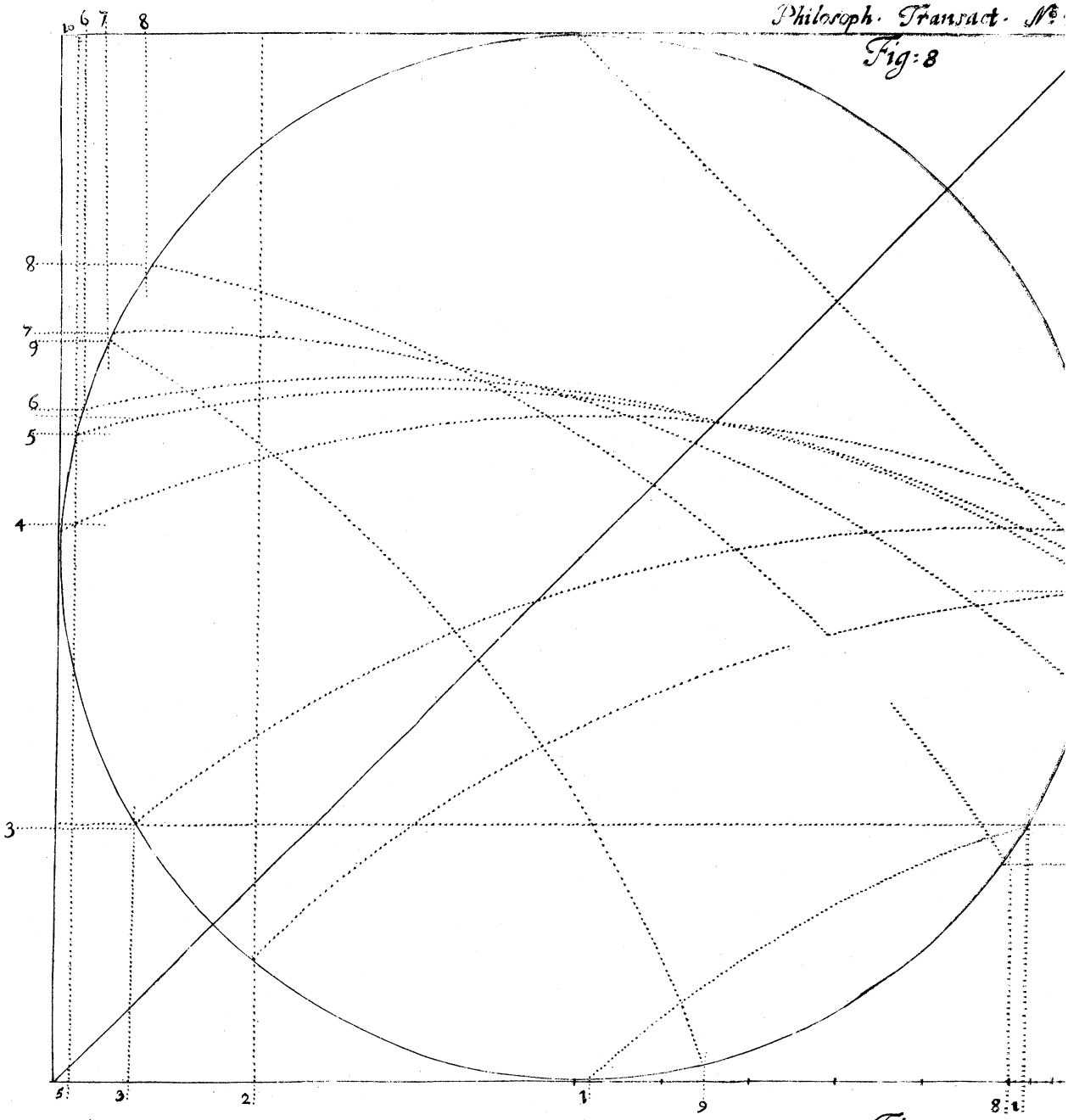


Fig. 1

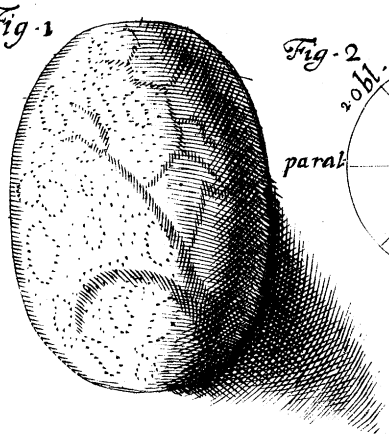
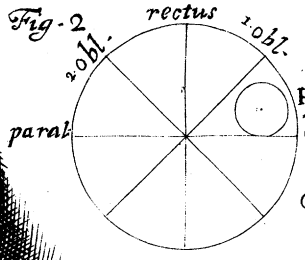


Fig. 2



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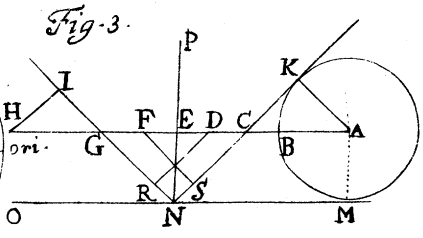

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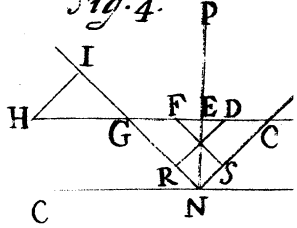


Fig. 5

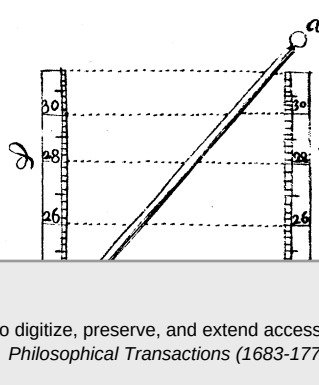


Fig 10

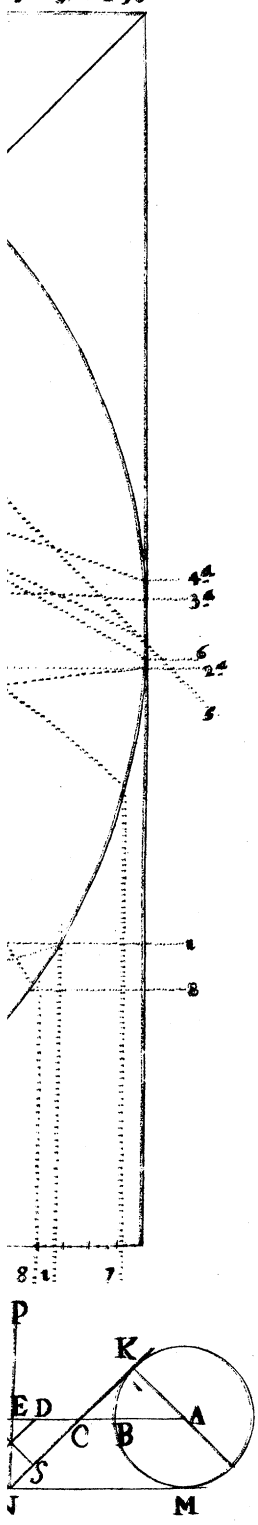


Fig 10

Fig. 5

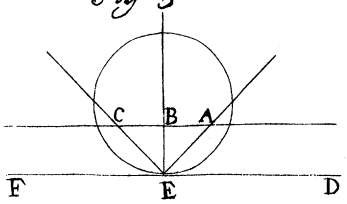


Fig. 6

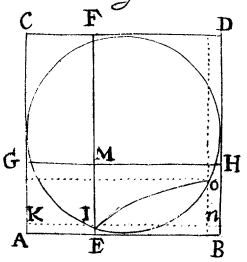
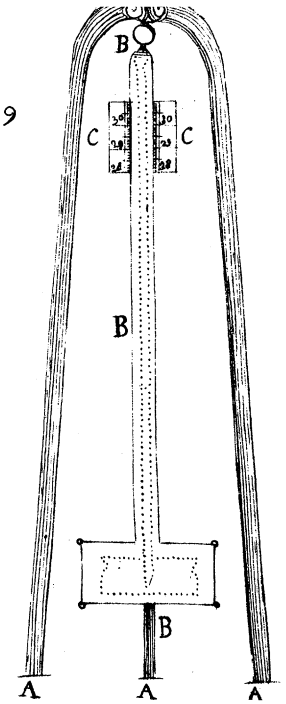


Fig. 9



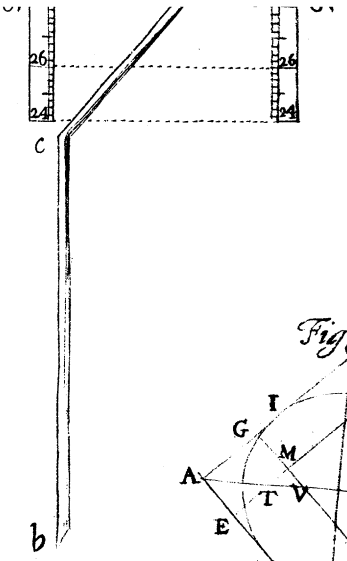
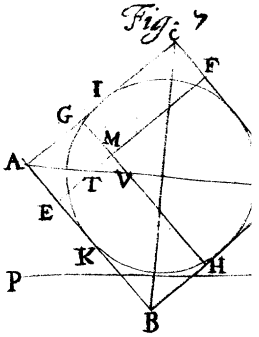
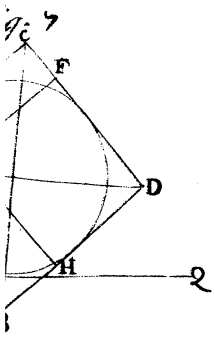


Fig. 7




F
D
H

I. *Part of a Letter of Mr.* William Derham, *Rector of* Upminſter, *dated* Dec. 6. 1697. *Giving an Account of ſome Experiments about the Heighth of the* Mercury *in the Barometer, at Top and Bottom of the* Monument : *and about portable Barometers.*

SOME time ſince, I had occaſion to ſatisfy my Curioſity, concerning the Variation of the Mercury on different heights ; and accordingly in *Sept.* 1696. I obſerved it on the *Monument*, by Two of Mr. *Quare*'s beſt Portable Barometers. By the beſt of the Two (for both differed) I found the *Mercury* deſcended $\frac{1}{10}$ of an Inch at the heighth of 80 Feet, and $\frac{2}{10}$ at 160 Feet.

But ſince that, finding my Obſervations a little different from Mr. *Halley*'s on *Snowden-Hill*, in *Philoſ. Tranſact.* Numb. 229. I thought it neceſſary to renew my Experiments more nicely ; and accordingly laſt *November*, tried again with other portable Barometers ; which err'd intollerably. So that by the by, few of the portable Barometers that I have yet met with, are to be depended upon in ſuch Experiments.

I therefore contrived to carry up the Torricellian Experiment to the Top of the *Monument*, thus : I provided a pretty large Glaſs Tube well cleaned : This I lodged in Wire, and filled with well ſtrained *Mercury* ; which being cleared of all Air, I then plunged the Bottom of the Tube into a broad Ciſtern of *Mercury*, and then fixed both the Tube and Ciſtern together, in the Wire Caſe or Frame. On the Top I left an Eye in the Wire, to ſuſpend the whole Barometer on a String, that it might hang pendulouſly, which is abſolutely neceſſary ; becauſe if the Ciſtern be deeper on one ſide than another, or if the Tube hang more towards one ſide than the other, it will cauſe a great and erroneous Variation in the *Mercury* above, according as the Tube ſtands perpendicularly, or not.

My Inſtrument being thus (I think) very nicely prepared, I marked exactly the Height of the Quickſilver, upon Two Narrow

Narrow Labels of Paper, paſted on each ſide the Tube, both at the Bottom, and in my Aſcent up the *Monument*. The Differences of the *Mercury's* Height I meaſured with a Decimal Inch Scale on thin Braſs. The Quantity of my Aſcent, I meaſured with a Gunter's Chain, becauſe a String would ſtretch.

By the niceſt Obſervation I could make, I found that at the height of 82 Feet the *Mercury* fell $\frac{1}{10}$ of an Inch, and at about 164 Feet $\frac{2}{10}$.

By tarrying above ſomewhat long, I perceived the Preſſure of the Atmoſphere was ſomewhat altered, ſo that the *Mercury* in my Deſcent, was about ,01 of an Inch different from my Obſervations in aſcending. Upon which, I repeated my Experiment by aſcending and deſcending quicker. At both which times, my Obſervations agreed exactly with the firſt Tryal. From whence I conclude that at every 82 Feet height, or thereabouts, the *Mercury* will deſcend ,1 Tenth of an Inch.

I was deſirous to have obſerved at this time, the Proportions of the Deſcent of the *Mercury*, according to Dr. *Wallis's* Remarks in his Letter to you, *Numb.* 231. but found it in vain on ſo ſmall a height. However, conſidering there is a Difference of 8 Feet between Mr. *Halley's* Obſervations and mine (which would alter the *Mercury* ,01 of an Inch, which is perceptible) I am inclined to think, that an higher Aſcent than 82 Feet is neceſſary to cauſe the *Mercury* to deſcend $\frac{1}{10}$, the higher we are in the Atmoſphere. But this I leave to your, and ſuch other better Judgments, and Obſervations.

Thus, Sir, I have troubled you with the Method I took, as well as the Obſervations themſelves, that you may the better judge how far what I have done deſerveth Credit, and alſo, that I may give ſome Cautions I found neceſſary to be obſerved in ſuch Experiments as theſe.

To what hath been ſaid, I beg your Patience, while I add a Deſcription of a Portable Barometer, which I conceive may be of great uſe in the former, and many other ſuch Experiments.

Provide a ſtrong Glaſs Tube. Let the Head of it be pinched at about an Inch from the top, ſo as to make a narrow Neck, whoſe Orifice ſhall be as big almoſt as a Straw. This (which is Mr. *Quare's* way) will much bridle the blow of the *Mercury* againſt

againſt the top, as it danceth up and down, which endangers breaking off the top of the Tube. The bottom of the Tube I would have ground aſlant near half an Inch, that the bottom of the Tube touching the bottom of the Ciſtern, the Orifice thereof may lye about the middle of the *Mercury* in the Ciſtern: which will prevent the Air getting into the Tube, by reaſon the *Mercury* is always about the Mouth of the Tube. The Ciſtern muſt be made wide, either of Glaſs, or cloſe-grained Wood; round the Brim of which, on the out-ſide, muſt be a Notch to tye on the Leather that is to cover it. When the Tube is filled, cleared of Air, and plunged into the Ciſtern near full of *Mercury*, encloſe the *Mercury* with gentle Leather tied very faſt round the Tube near the bottom, which being ſpread over the Ciſtern, tie it round that alſo: The Tube and Ciſtern, thus conjoin'd with Leather, muſt be lodg'd in a Caſe, made very fit to receive both, where they muſt lye very faſt. Thro' the Caſe let three or four Holes be bored, to let the Air in freely to the Leather that covers the Ciſtern, which lying cloſe againſt the Holes, will firmly enough keep the *Mercury* from running out at them.

The whole Inſtrument thus prepared, muſt be ſuſpended on the Top: For which purpoſe a Tripos may be beſt, whoſe Legs open and ſhut by Joynts at the Top.

The Weather-plates are to be put upon the Frame, by ſetting them to the ſame height, at which the *Mercury* ſtands in a common Barometer.

That the whole may be better apprehended, I have annexed the following Figure 9. In which

A. A. A. A. Is the Tripos.

B. B. B. The Frame or Caſe, with the Barometer and Ciſtern in it, repreſented by prickt Lines.

C. C. The Weather-plates.

Fig. 10. Repreſenteth a Tube communicated to me by a Friend, which ſerveth for the more nice meaſuring the height of the *Mercury*: For an Inch of perpendicular height, may be made 2 or 3, by bending the Tube more or leſs. This Tube may be crooked at 28 Inches length, for common uſe; but at 23 or 24 Inches for greater heights, as *Snowdon* (or higher Hills) on which it deſcended to 26,1 Inches in Mr. *Halley's* Obſervations.

a The head of the Tube, with its narrow Neck, to bridle the Blow of the *Mercury*, as before directed.

b The bottom ground aſlant, as was before directed.

c The Crook.

d d The Weather Plates.

Fig: 8

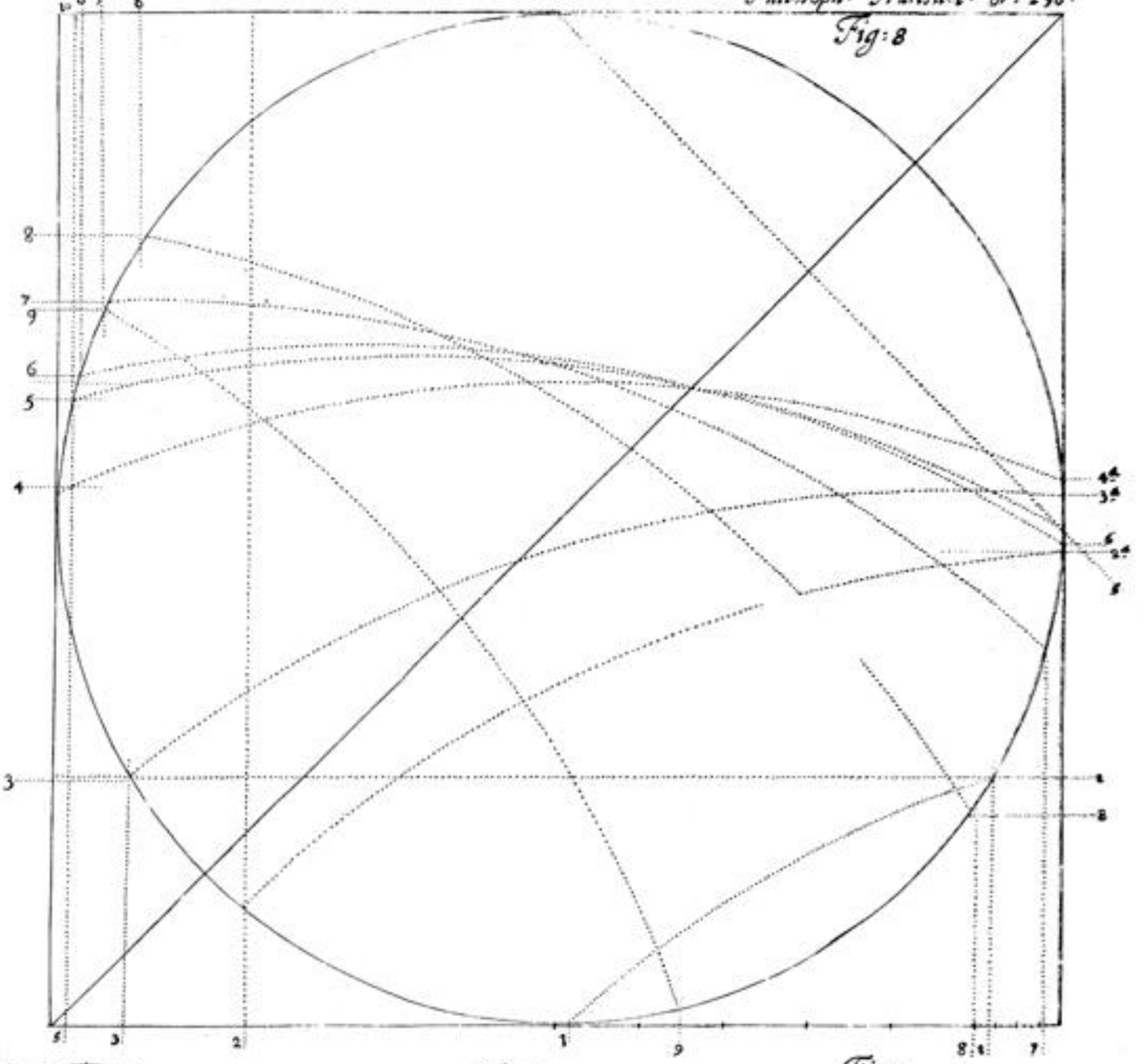


Fig. 1

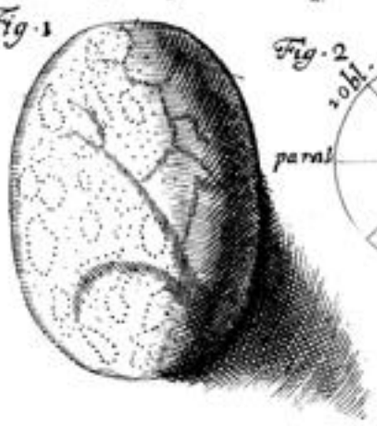


Fig. 2

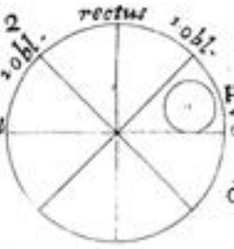


Fig. 3

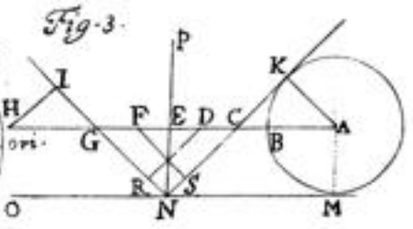


Fig. 4

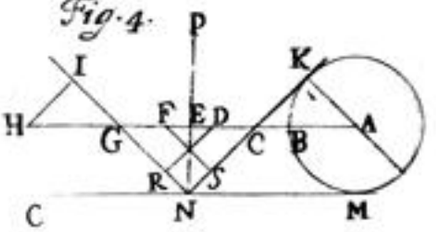


Fig. 5

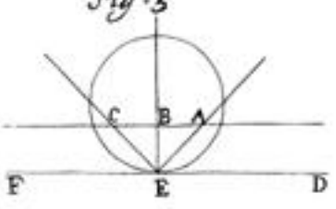


Fig. 6

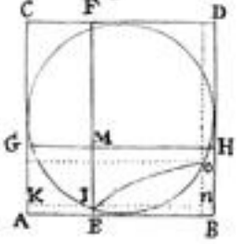


Fig. 9

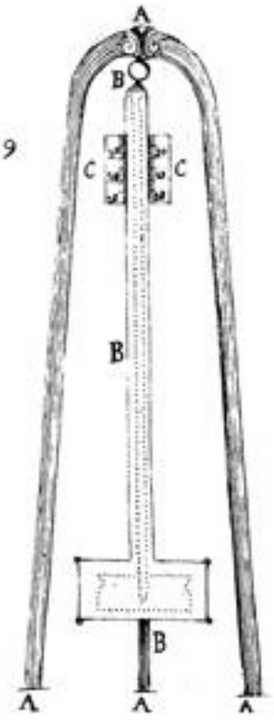


Fig 10

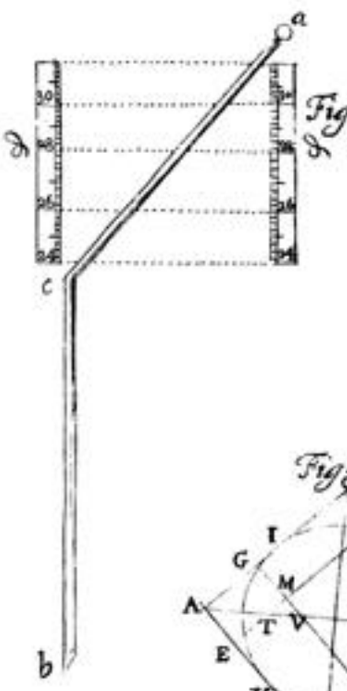


Fig. 7